

FIG. 1

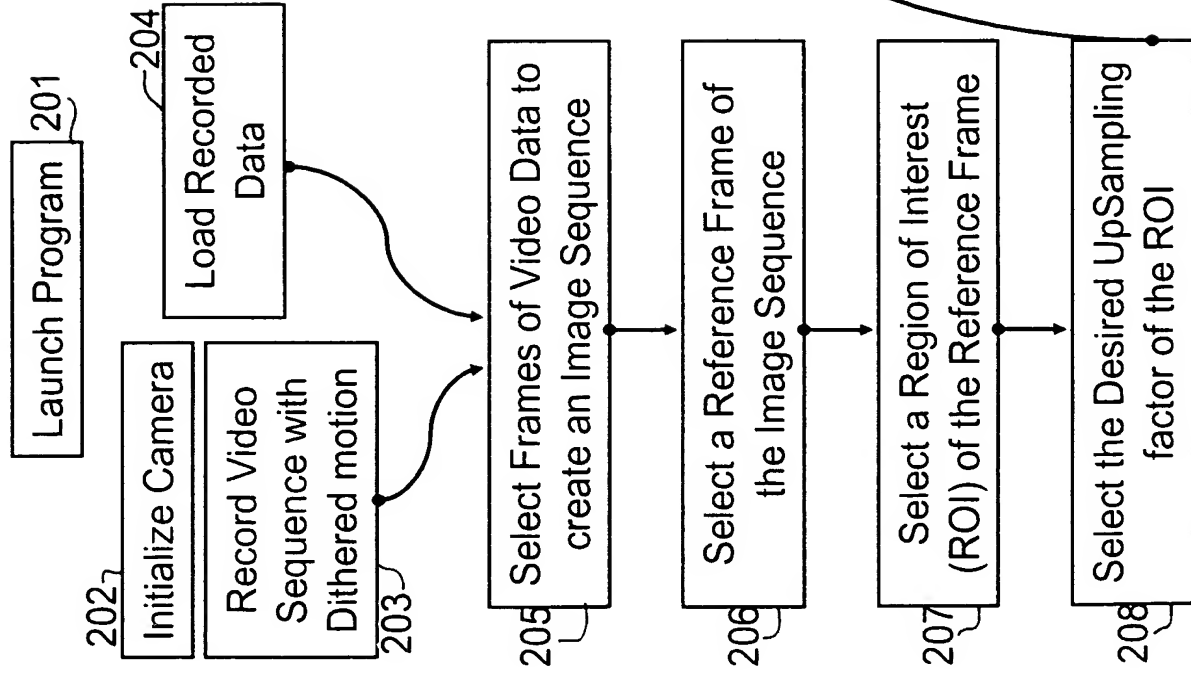


FIG. 2

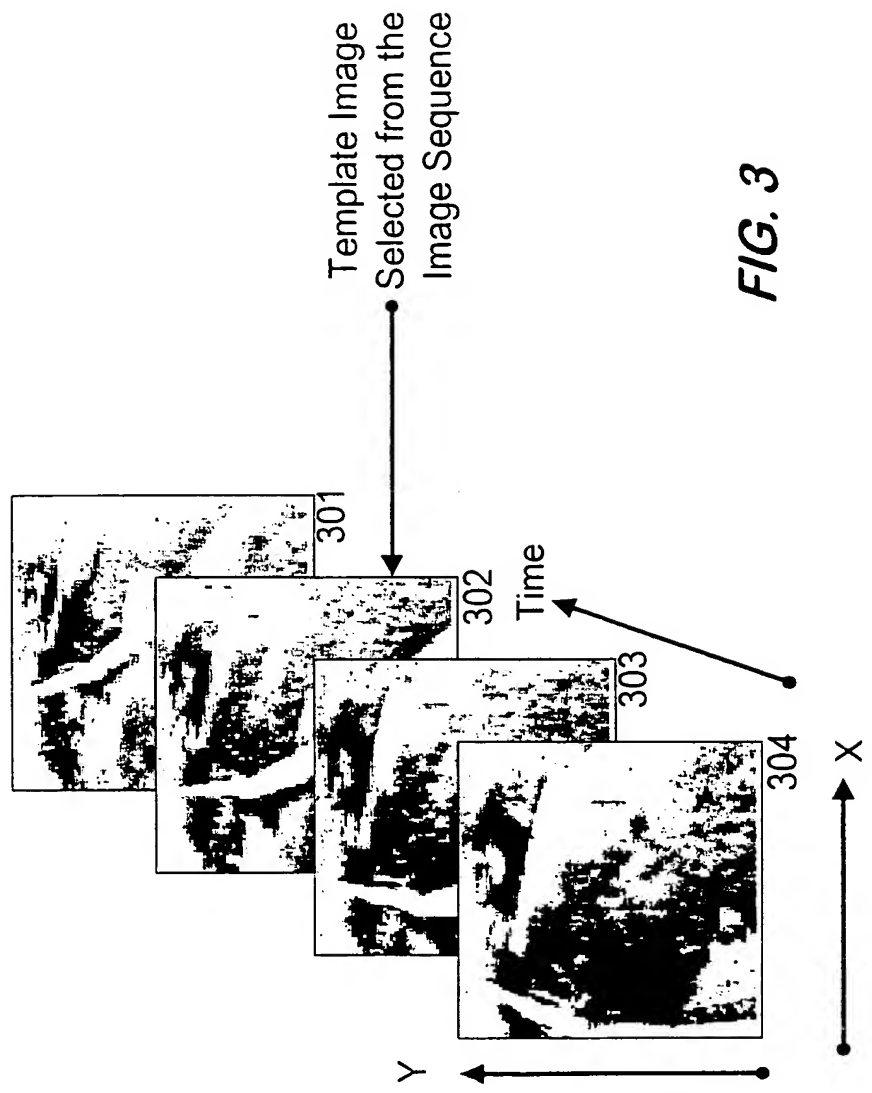


FIG. 3

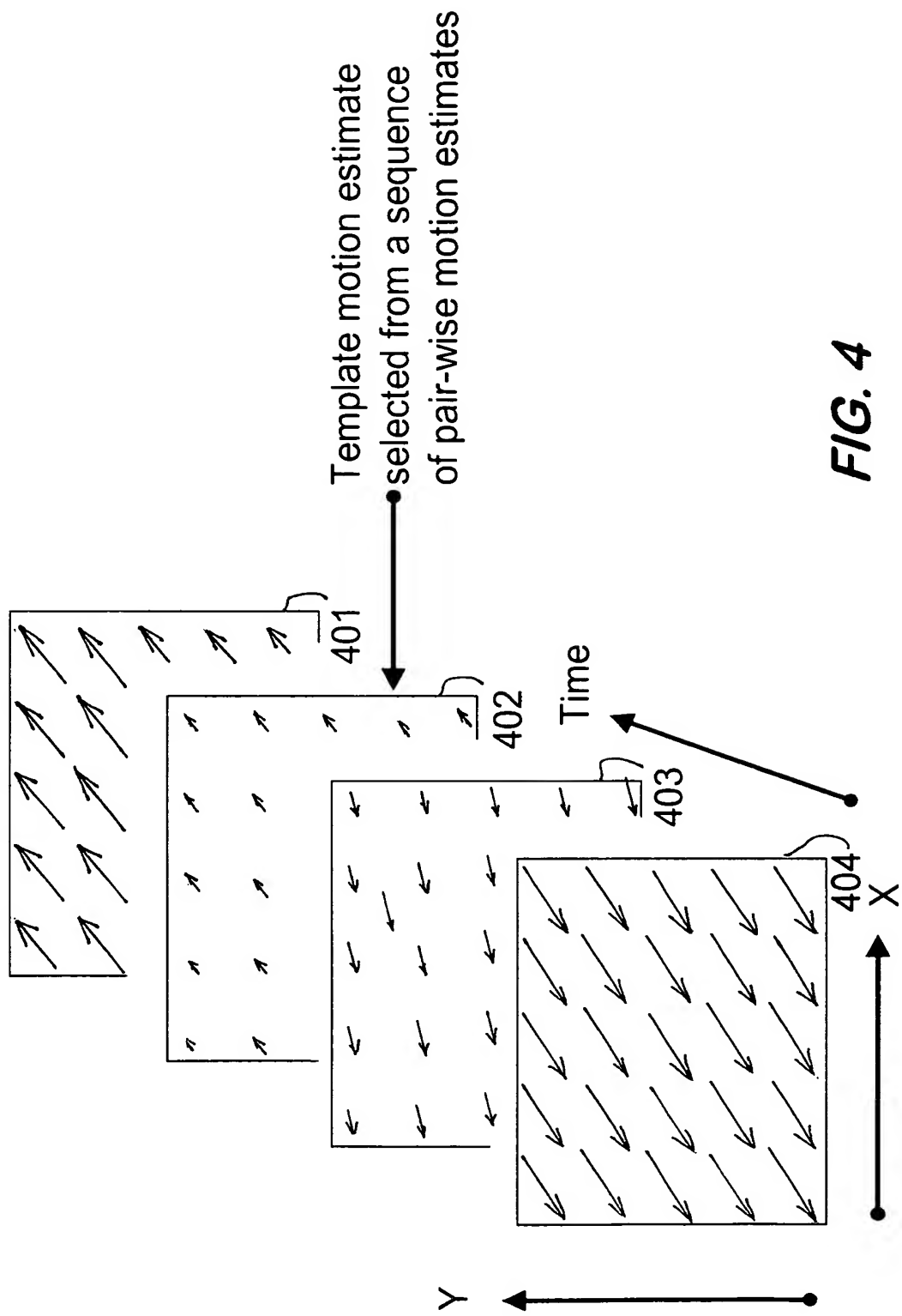


FIG. 4

```

function [shift] = correlation2D(ref,tgt);
ref = double(ref);tgt = double(tgt);size = size(ref);
corr2D = fftshift(iff2(fft2(ref).*conj(fft2(tgt))));
[Y,l] = max(corr2D(:));
[yy,xx] = ind2sub(size,l);
shift = [yy xx] - size/2 - [1 1];
shift = -shift;

```

FIG. 5

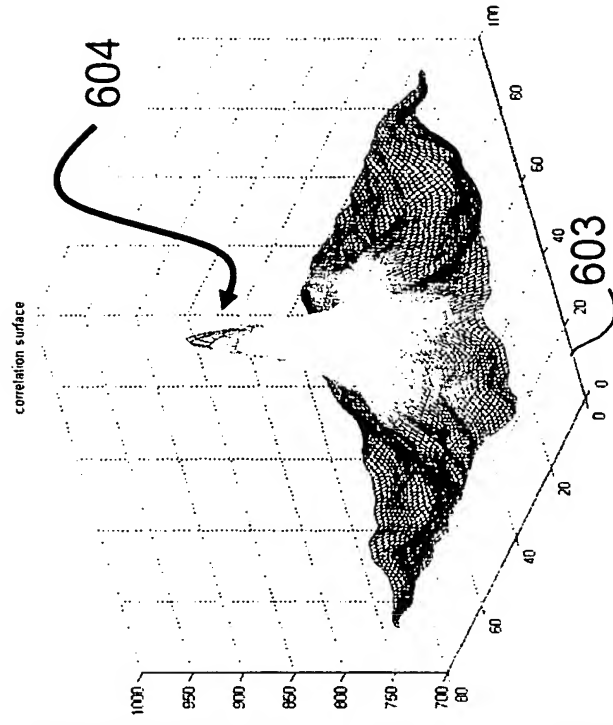
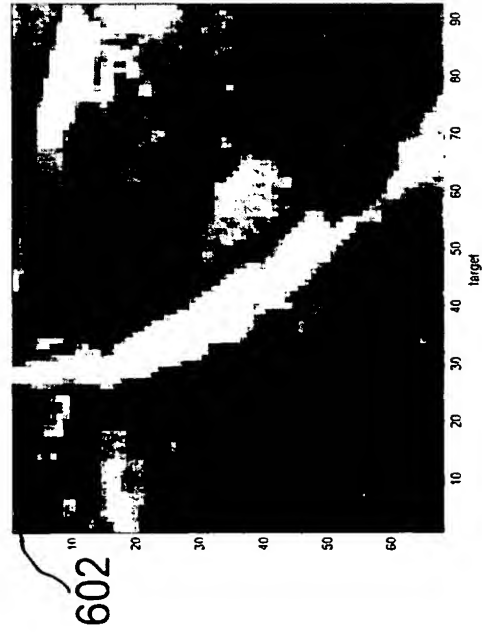
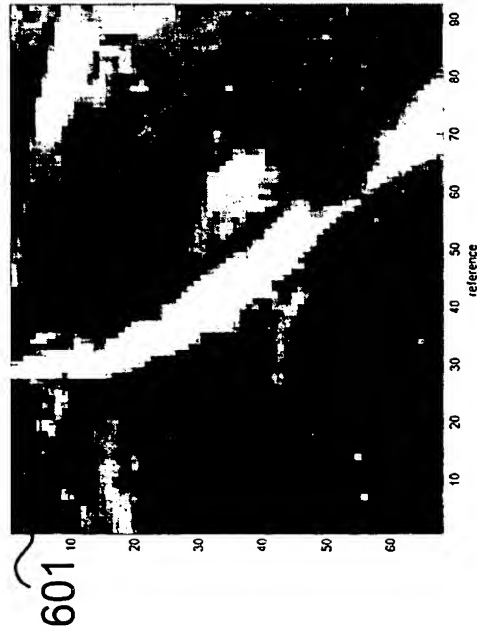


FIG. 6

```

function [shift] = grad_est(ref,tgt);
ref = double(ref);
tgt = double(tgt);
S000 = (ref(1:end-1,1:end-1));
S100 = (ref(2:end-0,1:end-1));
S010 = (ref(1:end-1,2:end-0));
S110 = (ref(2:end-0,2:end-0));
S001 = (tgt(1:end-1,1:end-1));
S101 = (tgt(2:end-0,1:end-1));
S011 = (tgt(1:end-1,2:end-0));
S111 = (tgt(2:end-0,2:end-0));
%
dSdx1 = (S100-S000+S110-S010+S101-S001+S111-S011)/4;
dSdx2 = (S010-S000+S110-S100+S011-S001+S111-S101)/4;
dSdx3 = (S001-S000+S101-S100+S011-S010+S111-S110)/4;
%
aa = dSdx1.^2;
a = sum(aa(:));
bb = dSdx2.^2;
b = sum(bb(:));
ab = dSdx1.*dSdx2;
d = sum(ab(:));
A = [a d; d b];
%
ac = dSdx1.*dSdx3;
bc = dSdx2.*dSdx3;
B = -[sum(ac(:)) sum(bc(:))];
%
shift = A \ B;
shift = shift';

```

FIG.7

(1,1)	(1,2)	(1,3)	...	(1,m)
(2,1)	(2,2)	(2,3)	...	(2,m)
(3,2)	(3,2)	(3,3)	...	(3,m)
...
(n,1)	(n,2)	(n,3)	...	(n,m)

FIG. 8

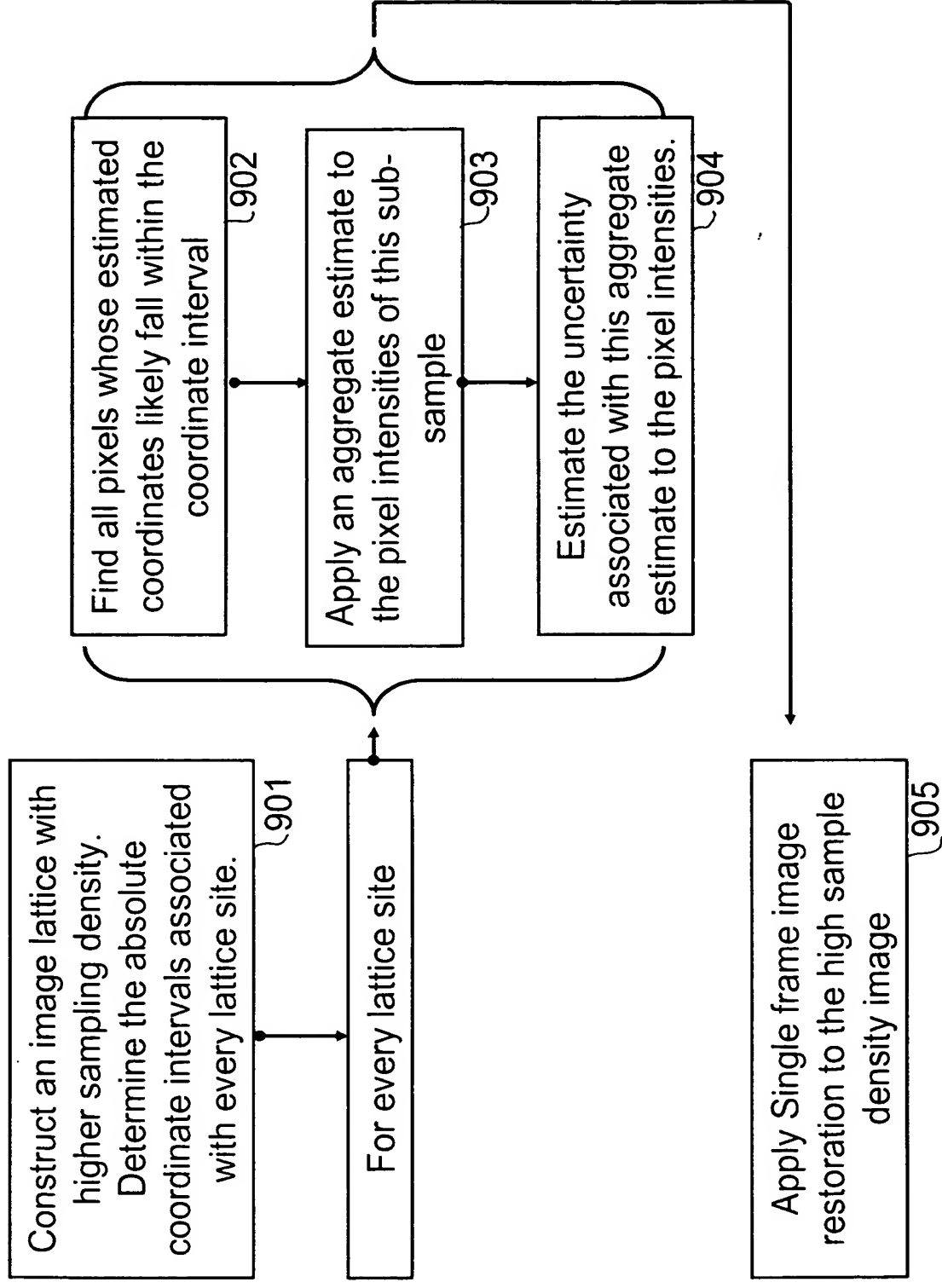


FIG. 9

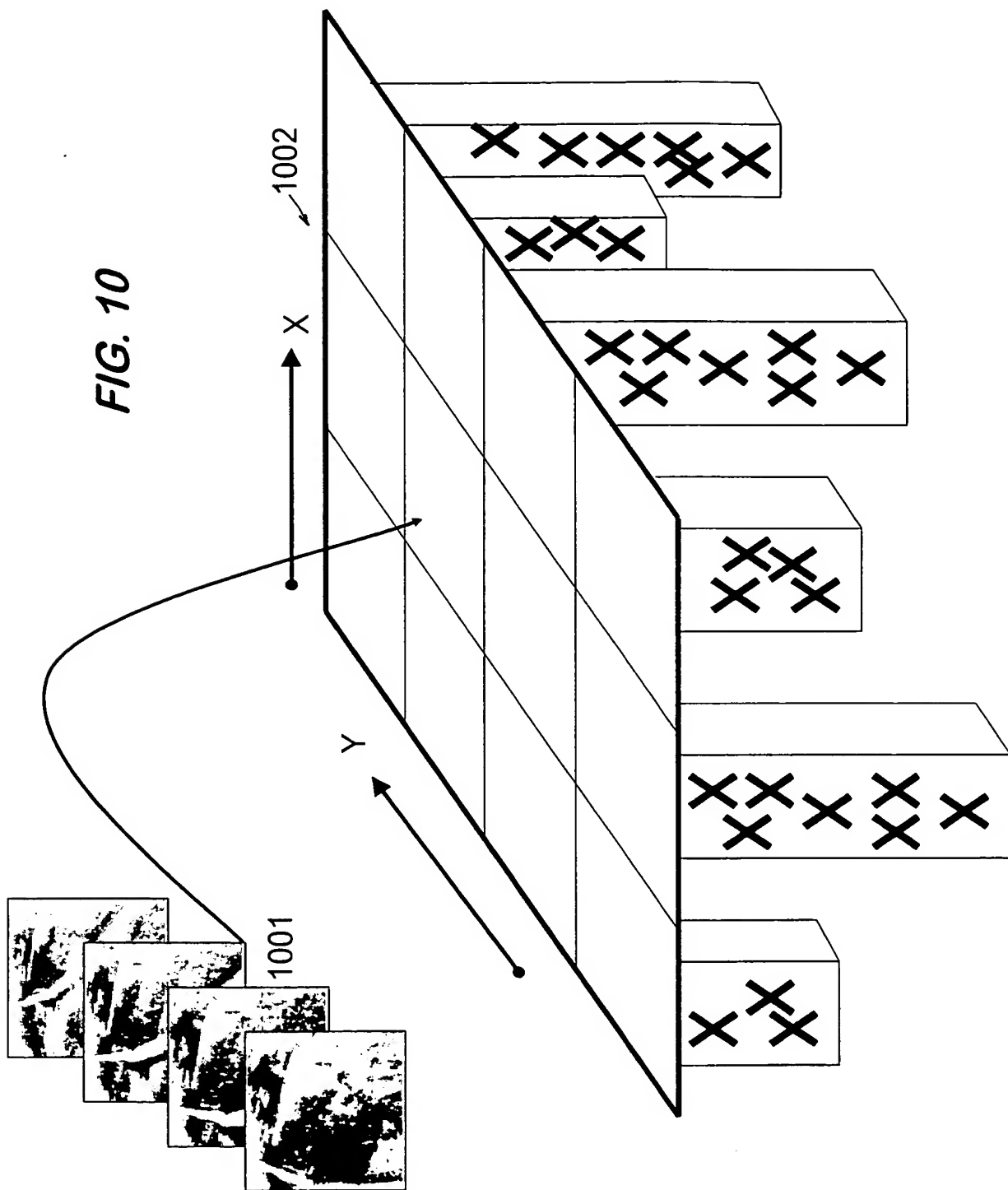


FIG. 10